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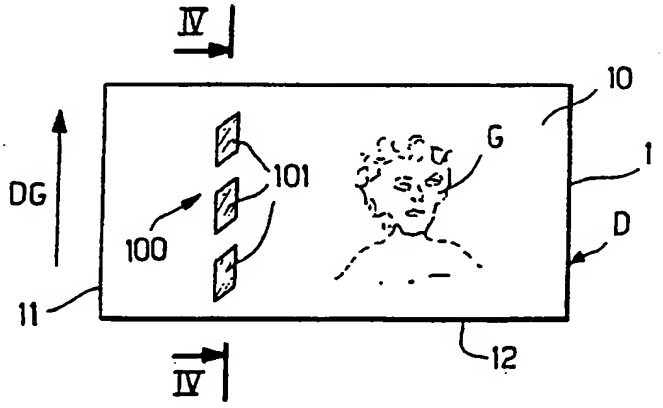

(57) Abstract

The invention concerns a credit or security document comprising an anti-forgery device. In accordance with the invention the anti-forgery device is in the form of a discontinuous reflecting surface (100) formed by a succession of individual reflecting elements (101) applied by transfer to a face (10) of the document (D) and organised in a general direction (DG); each individual reflecting element (101) has both a dimension of several millimetres and optimum compactness for a given reflection area, in such a way that the reflection phenomenon is clearly apparent to the naked eye and blinds the known optical analysis or reproduction systems. The invention also concerns a carrier strip with transferable reflecting pattern for producing such a document. Use in particular for the production of banknotes provided with an anti-forgery device applied by transfer.

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Credit or security document comprising an anti-forgery device, and a carrier strip with transferable pattern for producing such a document

The invention concerns credit or security documents and more particularly documents comprising an anti-forgery device. The documents in question are all fiduciary or credit documents or value documents which, by virtue of their nature or the rights which they can impart, have to be protected from forgeries, falsification or reproduction. That is the case for example with title documents, certificates, cheques and traveller's cheques, stamps, credit cards, bonds, vouchers, tickets or security documents such as identity cards, passports ..., that list not being limitative.

It has already been proposed that a metallised wire which is totally or alternatively integrated into the paper of a document may be used, which wire may be encoded by virtue of discontinuous coating of a wire of non-ferromagnetic material with a ferromagnetic material (see for example British patents Nos 1 095 286 and 1 127 043).

That procedure has long been in use but it is always invariably associated with authentication of the document by means of a detector which is especially adapted to the wire in question, and does not permit photocopying of the document to be effectively resisted: the image of the wire remains extremely thin and not only draws little attention by virtue of examination with the naked eye but it gives an extremely small reflecting surface which causes little disturbance in reproduction of the document.

Various procedures have also been proposed, using special inks, in particular inks which are referred to as change-effect inks, which make it possible for example to go from a blue colour to a green colour in dependence on the inclination of the document, or inks which cause a colour to appear only when subjected to a certain irradiation step (for example UV-radiation). Reference may be made for example to US patent

No 4 175 776 and European patents Nos 0 327 788 and 0 340 163. Those procedures are generally burdensome so that the use thereof is limited to areas of very small dimensions with respect to the dimensions of the document.

It has also been proposed that those methods can be combined by applying by a transfer operation a continuous repetitive pattern in strip form to a part of the document, and overprinting that part of the document using a security ink (see for example European patent No 0 093 009). As an alternative, in order better to resist colour photocopying, it has been proposed that small areas can be overprinted with an ink containing a possibly coloured reflecting substance, for example of aluminium powder (see for example US patents Nos 4 066 280 and 4 352 706).

Mention may also be made of the procedures which provide for coating the document with a very thin metal film and then printing on and embossing the document (see for example US patent No 4 420 515), as well as the procedures which involve the application of holograms to a document (see for example French patent No 2 535 864, British patent No 1 517 840 and US patent No 4 171 864), or yet again intaglio printing (see for example French patent No 2 192 496).

However, there is no doubt that those procedures make it possible to attract the attention of an alerted or experienced viewer but they are still relatively burdensome and they do not always provide good resistance to photocopying of the documents in question.

An object of the present invention is to provide a credit or security document whose anti-forgery device has a higher level of performance than the above-mentioned systems, both in regard to examination with the naked eye and in regard to modern reproduction and duplicating procedures.

Another object of the invention is to provide a document which gives a high degree of protection from reproduction thereof without involving embossing and/or hologram methods.

A further object of the invention is to provide a document in which the anti-forgery device is capable of being set in place both continuously on a strip of paper which passes along continuously and on documents in the form of sheets which have already been cut up, although operation on a reel is generally preferred when possible.

Finally still another object of the invention is to provide a document in which the anti-forgery device adheres perfectly to said document and is capable of withstanding wear and/or a chemical attack by the solvents which are usually employed in the field of printing.

The invention more particularly concerns a credit or security document comprising an anti-forgery device characterised in that the anti-forgery device is in the form of a discontinuous reflecting surface formed by a succession of individual reflecting elements applied by transfer to a face of the document and organised in a general direction of orientation which is predetermined with respect to the edges of said document, each individual reflecting element having both a dimension which is appreciated transversely to said general direction of several millimetres and optimum compactness for a given reflection area, in such a way that the reflection phenomenon is clearly apparent to the naked eye and blinds the known optical analysis or reproduction systems.

In accordance with a particular feature, application of the individual reflecting elements by direct transfer on to a face of the document is continuous, so that the intermediate spaces between adjacent individual elements comprise a non-reflecting but nonetheless visible covering originating from an initial carrier strip which has the discontinuous pattern to be transferred.

In an alternative configuration, application of the individual reflecting elements by direct transfer on to a face of the document is continuous, the intermediate spaces between adjacent individual elements being produced by printing with a white ink of a discontinuous pattern on a continuous reflecting band, after transfer of said

continuous reflecting band from an initial carrier strip. In accordance with another alternative configuration, the intermediate spaces are produced by partial dissolution of a continuous reflecting band after transfer thereof from an initial carrier strip.

In accordance with another particular feature, direct transfer results from the initial carrier strip and a strip of paper being passed between a pressure cylinder and a heating backing cylinder; as an alternative, direct transfer results from the initial carrier strip and a strip of paper being passed between a pressure cylinder with a continuous pressure track and a heating backing cylinder. It is also possible for direct transfer to result from the initial carrier strip being struck with a die for continuous application on a sheet of paper.

In an alternative configuration of continuous application of the individual reflecting elements, application by direct transfer on to a face of the document may be discontinuous, so that the intermediate spaces between adjacent individual elements are free from any covering.

It is then possible for the discontinuous character of the pattern to result from an initial carrier strip with a continuous reflecting band, and a strip of paper, being passed between a pressure cylinder with a discontinuous pressure track and a heating backing cylinder; as an alternative, the discontinuous character of the pattern results from the initial carrier strip being struck with a die for discontinuous application, on to a sheet of paper. In that particular case, the non-reflecting but visible elements referred to above do not appear.

Advantageously also, each individual element is covered with a protective varnish or lacquer which has a high level of resistance to abrasion and solvents.

Preferably also, each individual element forms a mirror capable of reflecting all visible wavelengths. Advantageously in that case, the individual reflecting elements are formed by a fine metal layer and preferably a fine layer of aluminium; in particular the mirror formed by some at least of the individual reflecting elements is complete or

flat without being disturbed by geometrical elements at least partially covering said mirror.

Advantageously also, the individual reflecting elements of the reflecting surface have a contour of quadrilatural shape.

For example, the contour is in the shape of a rectangle of which an edge is parallel to the general direction of orientation of the individual reflecting elements. In an alternative configuration, the contour is in the form of a parallelogram of which an edge is parallel to the general direction of orientation of the individual reflecting elements and preferably then the other edge of the parallelogram is inclined at a given angle with respect to said general direction of orientation, said angle preferably being close to 45°.

Advantageously in that case the width of the contour, as considered in a direction which is orthogonal to said general direction of orientation, is at least equal to three millimetres and the length of the contour, as considered in a direction which is parallel to said general direction of orientation, is preferably between four and ten millimetres.

Preferably also the general direction of orientation of the individual reflecting elements is parallel to the short side of said document.

It is finally possible for the document on its two faces to comprise an anti-forgery device which is in the form of a discontinuous reflecting surface, said two devices preferably being formed by identical individual reflecting elements.

The invention also concerns a carrier strip comprising a tranferable reflecting pattern for providing a fiduciary or credit document or security document comprising one at least of the above-mentioned features, said carrier strip being characterised in that it is of a multi-layer structure with in succession an upper layer of plastic material serving as a carrier, a layer of wax or glue which

melts in the hot condition, a very fine metal layer constituting the reflecting pattern to be transferred, and finally a layer of hot-melting glue for affording adhesion of said metal layer to a face of a document of paper.

Preferably a layer of varnish or lacquer is also provided between the layer of hot-melting glue or wax and the fine metal layer, said layer of varnish providing protection for the transferred reflecting pattern, in particular in relation to abrasion and solvents.

Advantageously also, another layer of varnish is further provided between the fine metal layer and the adhesion glue layer, said varnish layer providing protection for the reflecting pattern to prevent penetration of the metal particles into the paper of the document upon transfer of the reflecting pattern.

Other features and advantages of the invention will be more clearly apparent from the following description and the accompanying drawings concerning a particular embodiment, with reference to the Figures in which:

Figure 1 is a plan view of a document comprising an anti-forgery device according to the invention,

Figure 2 is a view on a larger scale of two individual reflecting elements forming part of the above-mentioned anti-forgery device,

Figure 3 illustrates an alternative form of Figure 2 in which the contour of the individual reflecting elements is rectangular,

Figures 4a and 4b are two sections taken along line IV-IV in Figure 1, illustrating two alternative configurations respectively with and without a protective varnish,

Figures 5a and 5b are two sections illustrating the multi-layer structure of two alternative configurations of an initial carrier strip according to the invention, the carrier strip being used to provide for transfer of the anti-forgery device, respectively with and without protective varnish (those Figures are thus to be compared to Figures 4a and 4b above, showing the document after transfer of said anti-forgery device),

Figure 6 diagrammatically illustrates continuous transfer of the anti-forgery device by being passed between two cylinders comprising a pressure cylinder and a heating backing cylinder,

Figure 7 is a profile view illustrating said cylinders between which the strip of paper and the initial carrier strip carrying the anti-forgery device to be transferred continuously pass,

Figures 8 and 9 illustrate two alternative forms of Figure 7, with a pressure cylinder comprising a pressure track which is discontinuous and continuous respectively, and

Figure 10 is an overall view showing a machine which can be used to advantage for continuouslyeffecting transfer of the anti-forgery device on to a strip of paper which moves continuously through the machine.

Figure 1 shows a document D which is here in the form of a rectangular sheet 1, comprising an anti-forgery device 100 according to the invention.

In accordance with an essential feature of the invention, the anti-forgery device is in the form of a discontinuous reflecting surface 100 formed by a succession of individual reflecting elements 101 organised in a general direction DG of orientation which is predetermined with respect to the edges 11 and 12 of the document.

As will be described in greater detail hereinafter, the individual reflecting elements 101 are applied by transfer (preferably in the hot condition) on to a face 10 of the document D. In addition each individual reflecting element 101 has both a dimension, as appreciated transversely to the general direction DG, of several millimetres, and optiumum compactness for a given reflection area which is evaluated by a coefficient corresponding to the reflection area/perimeter ratio, in such a way that the reflection phenomenon is clearly apparent to the naked eye and blinds the known optical analysis or reproduction system, in particular by virtue of a high reflection capacity and

relatively large reflection surfaces. Any value which is at least equal to 0.5 mm is considered satisfactory, for the above-mentioned ratio.

The document D here comprises a printed graphic device G and a discontinuous reflecting surface 100 whose general direction DG is parallel to the short side 11 of the document. It will be appreciated that such an arrangement is only one possible example but the orientation DG which is selected to be parallel to one of the edges of the document, in this case the short edge, is advantageous when the intention is for the document to be passed into an automatic processing machine, in which case the document then moves parallel to one of its edges.

Each individual element 101 can thus form a mirror which is capable of reflecting all visible wavelengths. Preferably in that case, individual reflecting elements 101 will be formed by a fine metal layer and in particular a fine layer of aluminium. By way of indication, that layer may be of the order of 0.05 µm in thickness. The choice of aluminium is advantageous for its very high coefficient of reflection, but it is apparent that it would be possible to choose other metals such as for example chromium. The mirror formed by some at least of the individual reflecting elements 101 is preferably complete or flat, without being disturbed by geometrical elements which at least partially cover said mirror.

The discontinuous surface 100 which is formed by a plurality of individual reflecting elements 101 thus permits substantial dazzling of the analysis or reproduction system, by virtue of the large dimension of each of the individual reflecting elements 101 in a direction which is transverse to the general direction DG. For that reason it should be noted that the known procedure which involves alternatively embedding a metal band or strip in the paper did not make it possible to produce a band whose width exceeds a millimetre.

In this case, by virtue of a transfer procedure, it is possible to use a discontinuous surface whose width exceeds 3 mm and can even go up to 10 mm.

In addition, still in order to provide for maximum dazzling of the analysis or reproduction system, each individual reflecting element 101 must exhibit optimum compactness for a given reflection area. That means that the surface area of each individual reflecting element 101 is as large as possible for a given perimeter or that the diameter of the largest circle which can be inscribed in the contour of an individual reflecting element, for a given reflection area, is at a maximum.

Figure 2 is a view on a larger scale of two individual reflecting elements 101 which are part of the above-mentioned anti-forgery device 100, each individual reflecting element 101 in this case being of a contour C in the form of a quadrilateral and more precisely here in the form of a parallelogram. Each individual reflecting element 101 is thus distributed in a discontinuous manner between two lines 105, 106 which are parallel to the general direction DG of the discontinuous surface 100. In an alternative configuration, as shown in Figure 3, it is possible to use a contour C in the form of a rectangle of which an edge (in this case the edge 103) is parallel to the general direction DG. The embodiment of Figure 2 is preferable however insofar as it makes it possible to have a short leading edge at an end point of each individual reflecting element, and consequently it makes it possible better to resist the risk of the metal particles which are transferred on to the document becoming detached. In the configuration shown in Figure 2, the edge 103 of each individual reflecting element 101 is parallel to the direction DG, with a dimension L which is preferably of the order of from 2 to 10 mm, while the short edge 104 is inclined at a given angle with respect to the general direction DG, that angle preferably being close to 45°. The dimensions of the individual

rectangular reflecting elements illustrated in Figure 3 are preferably identical to those indicated above, with a width l of the order of from 2 to 10 mm (that width corresponding to the distance between the contour lines 105, 106) and a length L of the order of from 2 to 10 mm. Those dimensions will be selected in such a way as to give a minimum surface area of 10 mm^2 for each individual reflecting element.

Such individual reflecting elements make it possible to achieve an extremely satisfactory coefficient of mirror reflection as the effective width of each of those elements is relatively substantial, said effective width moreover being considerably greater than that which could be obtained with a strip or band which is alternatively embedded in the paper of the document.

Figure 1 shows the existence of a discontinuous surface 100 constituting the anti-forgery device on a face 10 of the document D, but it is apparent that it is possible to provide such an anti-forgery device on the two faces of the document, each anti-forgery device being in the form of a discontinuous reflecting surface and the two devices then preferably being formed by identical individual reflecting elements 101. That makes it possible to produce a reflection phenomenon which is clearly apparent to the naked eye and which blinds the known optical analysis or reproduction systems, irrespective of the way in which the document is faced.

As stated hereinbefore, the succession of individual reflecting elements 101 is applied by transfer, preferably in the hot condition, on to a face of the document. Application by direct transfer on to a face of the document can be continuous so that the intermediate spaces 102 between adjacent individual reflecting elements 101 comprise a non-reflecting but nonetheless visible covering originating from an initial carrier strip having a discontinuous pattern to be transferred. Figure 6 diagrammatically illustrates continuous transfer of that kind of the anti-forgery device (whose pattern is here

discontinuous) by being passed between two cylinders comprising a pressure cylinder and a heating backing cylinder.

Figure 6 shows a reel 310 from which there is unwound a strip of paper P which passes around successive rollers 311, 312 and 313 before passing between a pressure cylinder 300 and a heating backing cylinder 301. An initial carrier strip F bearing the pattern to be transferred is unwound from a reel 314 in order also to pass between the cylinders 300 and 301, with the two strips P and F thus being pressed against each other, with the application of a given temperature, for hot transfer of the discontinuous pattern in such a way as to produce the desired discontinuous reflecting surface 100 with its succession of individual reflecting elements 101. Downstream of the transfer, the carrier strip F or more precisely the residual part thereof which served to carry the discontinuous pattern to be transferred is wound on to a reel 315. In this case, two smooth cylinders 300 and 301 are used, as can be seen from Figure 7. That provides for a transfer with clean edges, without embossing of the paper. After the transfer operation however the paper is heavily satined or glazed (its glazing has been substantially multiplied by 5), the thickness of the paper has decreased (substantially by 10%) and the paper has lengthened very slightly in the direction of movement (an elongation of the order of 2 °/oo is normally encountered). When the document D also has a watermark, which is the case in particular with bank notes, the watermark has then lost its sharpness after transfer of the discontinuous reflecting pattern.

It is possible to improve the transfer of that discontinuous pattern by providing a slightly different pressure cylinder, as shown in Figure 9: in fact, in this case the pressure cylinder 302 comprises a continuous pressure track 303 which presses the initial carrier strip F against the strip of paper P, bearing against the heating backing cylinder 301. That then retains the advantage of a transfer

with clean edges and without embossing of the paper, but, by virtue of the locally applied pressure, that arrangement also provides for a lack of satining or glazing of the paper and preservation of the sharpness of the watermark when the latter is provided.

It is also possible however to use an initial carrier strip F comprising a continuous reflecting band to be transferred on to the document.

In that case it is possible to choose either continuous transfer of the continuous reflecting band on to the paper and then arrange for a particular operation on the transferred continuous reflecting band to produce the intermediate spaces between adjacent individual elements, or, in an alternative mode of operation, it is possible to provide for discontinuous transfer of portions of the continuous reflecting band in order then directly to produce the intermediate spaces between adjacent individual elements.

When the procedure adopted is continuous application of a continuous reflecting band, it is then possible to produce the intermediate spaces 102 between adjacent individual elements 101 by printing with a white ink of a discontinuous pattern on the transferred continuous reflecting band or, in an alternative procedure, it is possible to produce those intermediate spaces by partial dissolution of the transferred continuous reflecting band.

In the case of discontinuous application, as shown in Figure 8 it will be possible to provide that the discontinuous character of the pattern results from the initial carrier strip F with a continuous reflecting band and the strip of paper P being passed between a pressure cylinder 304 with a discontinuous pressure track 305 and a heating backing cylinder 301. The discontinuous character of the pattern then results from a knurling action by the discontinuous pressure track 305 on the continuous reflecting band. However it is difficult to avoid flakes of reflecting material being randomly torn

away at the boundaries of the contours of the individual reflecting elements, which flakes may interfere with subsequent offset printing on the document. It is easy to understand that transfer of a discontinuous band by means of a continuous pressure cylinder (Figure 7) or by means of a cylinder with a continuous pressure track (Figure 9) makes it possible to avoid the formation of such flakes of reflecting material.

In an alternative configuration of direct transfer of the rotary type which has just been described above, it will be appreciated that it is possible to provide for direct transfer resulting from the initial carrier strip being struck with a die for applying same to a sheet of paper, within the framework of a procedure for transfer on to a sheet. That mode of operation which is not shown here is well known to those skilled in the printing art and it may concern transfer of a continuous reflecting band on to the paper (in that case the application die is continuous if the procedure involves a subsequent printing operation using a white ink on the transferred continuous reflecting band or partial dissolution of the transferred continuous reflecting band or it is discontinuous if such operations are to be avoided), as well as transfer of a discontinuous reflecting band (in that case the application die preferably being continuous).

The multi-layer structure of an initial carrier strip according to the invention will now be described, that carrier strip being used to provide for transfer of the above-specified anti-forgery device, this being applicable both in relation to a continuous and a discontinuous pattern to be transferred.

The view in section shown in Figure 5a thus illustrates an initial carrier strip F which successively comprises an upper layer 200 serving as a carrier, a layer 202 of hot-melting glue or wax, a very fine metal layer 201 for example of aluminium constituting the reflecting band to be transferred, and finally a layer 203 of hot-melting glue. The layer 200 will preferably be of plastic material,

being for example a layer of polyester which is from 10 to 15 µm in thickness, while the metal layer 201 will be of the order of a few hundredths of a micron, for example 0.05 µm. The wax or glue corresponding to the thickness 202 serves to provide for separation between the polyester layer 200 and the metal layer 201 in the hot transfer operation, and it will be of the order of from 2 to 5 µm in thickness. The glue constituting the layer 203 serves in turn to provide for adhesion between the metal layer 201 and the paper, and its thickness will also be of the order of 5 µm. It will be advantageous to provide that the material forming the layer 202 melts at a temperature T1 which is lower than the temperature T2 at which the adhesion layer 203 melts, in order to produce separation of the metal layer 201 from the polyester layer 200 just prior to transfer of the metal layer. By way of indication, the transfer operation will be effected using temperatures ranging from 110 to 150°C. After transfer, the document appears in section as illustrated in Figure 4a: it is thus possible to see a succession of individual reflecting elements 101 which are separated by intermediate spaces 102, and also traces 203' remaining from the glue 203, which have penetrated into the paper 1 just below the upward face of the document. The intermediate spaces 102 between adjacent individual elements 101 may comprise a non-reflecting but nonetheless visible covering originating from the initial carrier strip F having the discontinuous pattern to be transferred. The non-reflecting covering will comprise in this case the hot-application glue 203' but also possibly a protective varnish or lacquer, as will be described in the alternative configuration hereinafter.

Figure 5b illustrates a carrier strip F having a multi-layer structure which is more complex than that described above, insofar as it has two protective varnish layers.

This structure again comprises the upper polyester layer 200 serving as a carrier and the layers 202 and 203 of hot-melting glue

with, for the latter, a choice of material such that adhesion to the paper is stronger than adhesion to the polyester carrier. However the metallised zone corresponding to the layer 201 is here sandwiched between two layers of varnish 204 and 205, the thickness of which is of the order of from 1 to 5 µm. The upper layer of varnish 204 makes it possible to provide for protection of the transferred individual reflecting elements 101, having a high level of resistance to abrasion and solvents. The lower layer of varnish 205 also protects the metallised zone corresponding to the layer 201, by preventing the metal particles from penetrating into the paper in the transfer operation. After transfer, the document is as illustrated in section in Figure 4b: as before, there are again the individual reflecting elements 101 which are separated by intermediate spaces 102, and traces of glue 203' originating from the layer 203. However, and unlike the sectional view shown in Figure 4a, Figure 4b now shows a protective film produced from the layers of varnish 204 and 205, the upper layer corresponding to the layer for protecting the whole of the discontinuous reflecting surface. In this case the intermediate spaces 102 comprise a non-reflecting covering which is perfectly visible to the naked eye and which comprises protective varnish and traces of the hot-application glue. It should however be noted that the thicknesses of varnish have decreased in the transfer operation, by virtue of the pressure and temperature involved.

In the case of discontinuous application of the individual reflecting elements by direct transfer on to a face of the document, the intermediate spaces 102 between adjacent individual elements 101 are practically free of any covering.

Still in order to provide for maximum dazzle for optical analysis or reproduction systems, it will be an attractive proposition to provide as large a number as possible of individual reflecting elements 101 for a given dimension of the document. Preferably then

the spacing 102 between adjacent individual elements will be of the order of a fraction of the length of the contour of those elements, as considered in a direction parallel to the general direction of orientation DG. Thus, with a rectangular document such as a banknote which is of the order of 80 mm in width, it will be possible to arrange at least five individual reflecting elements to constitute the dicontinuous reflecting surface forming the anti-forgery device.

Reference will now be made to Figure 10 to described a machine which can be advantageously used for continuously effecting transfer of the anti-forgery device according to the invention on to a strip of paper in a continuous passage mode.

The transfer machine 400 comprises a frame structure 406 carrying a reel 401 of paper, from which a strip of paper P is unwound. The strip of paper P firstly passes through a successive of rollers forming part of an assembly 402 for regulating the tension in the strip, then to the location of an assembly 403 which provides lateral guidance for correctly positioning the strip of paper P before proceeding for transfer of the anti-forgery device. The machine also has at least one film reel 430 on which is wound the initial carrier strip F carrying the anti-forgery device to be transferred. In this case, there are four reels 430 so as to be able simultaneously to transfer four reflecting strips for a given width of strip of paper corresponding to the strip wound on the reel 401. The strip of paper P and the initial carrier strip F meet at the location of a guide roller 404, against the periphery of which they are correctly applied by means of a downstream roller 405.

The two strips P and F thus arrive at the transfer station in the true sense, which is formed by a hot transfer assembly with its cylinder 407 which is for example heated by a hot water circulation, the associated circuit not being shown here. The two strips are applied against a substantial part of the surface of the heating

cylinder 407 by means of a system of pressing rollers 408 which are carried by movable brackets 409; Figure 10 shows the two positions of the assembly of the rollers 408, the operating position corresponding to application of the rollers against the surface of the cylinder 407, while the rest position corresponds to initial insertion of the two strips F and P beneath that cylinder. The movement from one position to the other is produced by means of application jacks 410 and 411 which make it possible to raise or lower and incline the brackets 409 supporting the rollers 408.

Downstream of the transfer station, the strip of paper (on to which the reflecting surface has been transferred) and the residual part of the initial carrier strip (that residual strip then only comprising the polyester layer which served as a carrier) pass around a first cooling cylinder 414 to which they are applied by an applicator roller 412 carried by a pivotally mounted lever 413, the position of the lever being controlled by an associated jack 427. The two strips also pass around a second cooling cylinder 415, the strips passing around the two cooling cylinders in an S-shaped configuration in order to provide for satisfactory strip contact and locking, as is well known in the printing art. The cooling cylinders 414 and 415 will be for example cooled by means of cold water, the associated circuit not being shown here. The strip of paper P bearing the anti-forgery device 100 then passes around an assembly 418 serving as a tension regulator for the re-winding operation and then moves against a guide cylinder 431 against which it is applied by a roller 419 carried by a pivotally mounted lever 425, the position of which is controlled by an associated jack 426. The strip of paper P carrying the anti-forgery device 100 then passes through a lateral guidance assembly 420 in order here to arrive at a severing station at which it is possible for a plurality of adjacent parallel strips, for example four strips, each comprising a reflecting band (which may be continuous or

discontinuous) to be cut up longitudinally: the severing station which, as will be appreciated, is in no way obligatory, is formed by a support roller 422 and cutting wheels 421. The cut strips finally pass around guide rollers 423 before final rewinding on to a reel 424.

The remaining part of the carrier strip (polyester film 200 having served as a carrier), after passing around the cooling cylinder 415, passes around a guide roller 416 before finally arriving at a station 417 for re-winding of the polyester film 200.

It will be appreciated that other types of machine can be envisaged for providing for transfer of the continuous or discontinuous reflecting band, but the above-described transfer station makes it possible to achieve particularly satisfactory results. In this respect reference may be made to European patent No 0 089 494 in which a hot transfer apparatus of this type is described.

The invention is not limited to the embodiments which have just been described but on the contrary it embraces any alternative configuration which, with equivalent means, involves the essential features set forth hereinbefore.

CLAIMS

1. A credit or security document comprising an anti-forgery device characterised in that the anti-forgery device is in the form of a discontinuous reflecting surface (100) formed by a succession of individual reflecting elements (101) applied by transfer to a face (10) of the document (D) and organised in a general direction (DG) of orientation which is predetermined with respect to the edges (11, 12) of said document, each individual reflecting element (101) having both a dimension, which is appreciated transversely to said general direction, of several millimetres and optimum compactness for a given reflection area, in such a way that the reflection phenomenon is clearly apparent to the naked eye and blinds the known optical analysis or reproduction systems.

2. A document according to claim 1 characterised in that application of the individual reflecting elements (101) by direct transfer on to a face (10) of the document (D) is continuous, so that the intermediate spaces (102) between adjacent individual elements (101) comprise a non-reflecting but nonetheless visible covering which originates from an initial carrier strip (F) which has the discontinuous pattern to be transferred.

3. A document according to claim 1 characterised in that application of the individual reflecting elements (101) by direct transfer on to a face (10) of the document (D) is continuous, the intermediate spaces between adjacent individual elements (101) being produced by printing with a white ink of a discontinuous pattern on a continuous reflecting band, after transfer of said continuous reflecting band from an initial carrier strip (F).

4. A document according to claim 1 characterised in that application of the individual reflecting elements (101) by direct transfer on to a face (10) of the document (D) is continuous, the

intermediate spaces (102) between adjacent individual elements (101) being produced by partial dissolution of a continuous reflecting band, after transfer of said continuous reflecting band from an initial carrier strip (F).

5. A document according to one of claims 2 to 4 characterised in that direct transfer results from the initial carrier strip (F) and a strip of paper (P) being passed between a pressure cylinder (300) and a heating backing cylinder (301).

6. A document according to one of claims 2 to 4 characterised in that direct transfer results from the initial carrier strip (F) and a strip of paper (P) being passed between a pressure cylinder (302) with a continuous pressure track (303) and a heating backing cylinder (301).

7. A document according to one of claims 2 to 4 characterised in that direct transfer results from the initial carrier strip (F) being struck with a die for continuous application on a sheet of paper.

8. A document according to claim 1 characterised in that application of the individual reflecting elements (101) by direct transfer on to a face (10) of the document (D) is discontinuous, so that the intermediate spaces (102) between adjacent individual elements (101) are free from any covering.

9. A document according to claim 8 characterised in that the discontinuous character of the pattern results from an initial carrier strip (F) with a continuous reflecting band, and a strip of paper, being passed between a pressure cylinder (304) with a discontinuous pressure track (305) and a heating backing cylinder (301).

10. A document according to claim 8 characterised in that the discontinuous character of the pattern results from the initial carrier strip (F) being struck with a die for discontinuous application, against a sheet of paper.

11. A document according to one of claims 1 to 10 characterised in that each individual element (101) is covered with a protective varnish (204) which has a high level of resistance to abrasion and solvents.

12. A document according to one of claims 1 to 11 characterised in that each individual element (101) forms a mirror capable of reflecting all visible wavelengths.

13. A document according to claim 12 characterised in that the individual reflecting elements (101) are formed by a fine metal layer and preferably a fine layer of aluminium.

14. A document according to claim 12 or claim 13 characterised in that the mirror formed by some at least of the individual reflecting elements (101) is complete or flat without being disturbed by geometrical elements at least partially covering said mirror.

15. A document according to one of claims 1 to 14 characterised in that the individual reflecting elements (101) of the reflecting surface have a contour (C) in the form of a quadrilateral.

16. A document according to claim 15 characterised in that the contour (C) is in the shape of a rectangle, of which an edge (103) is parallel to the general direction (DG) of orientation of the individual reflecting elements (101).

17. A document according to claim 15 characterised in that the contour (C) is in the form of a parallelogram, of which an edge (103) is parallel to the general direction (DG) of orientation of the

individual reflecting elements (101).

18. A document according to claim 17 characterised in that the other edge (104) of the parallelogram is inclined at a given angle (a) with respect to said general direction of orientation (DG), said angle preferably being close to 45°.

19. A document according to one of claims 15 to 18 characterised in that the width of the contour, as considered in a direction which is orthogonal to said general direction of orientation (DG), is at least equal to three millimetres.

20. A document according to one of claims 15 to 19 characterised in that the length of the contour, as considered in a direction which is parallel to said general direction of orientation (DG), is preferably between four and ten millimetres.

21. A document according to one of claims 1 to 20 which is of a rectangular shape characterised in that the general direction (DG) of orientation of the individual reflecting element (101) is parallel to the short side (11) of said document.

22. A document according to one of claims 1 to 21 characterised in that it comprises on its two faces an anti-forgery device which is in the form of a discontinuous reflecting surface (100), said two devices preferably being formed by identical individual reflecting elements (101).

23. A carrier strip comprising a transferable reflecting pattern for providing a credit or security document according to one of claims 1 to 22 characterised in that it is of a multi-layer structure with in succession an upper layer (200) of plastic material

serving as a carrier, a layer (202) of hot-melting glue or wax, a very fine metal layer (201) constituting the reflecting pattern to be transferred, and finally a layer of hot-melting glue (203) for affording adhesion of said metal layer to a face of a document of paper.

24. A carrier strip (F) according to claim 23 characterised in that a layer (204) of varnish is further provided between the layer (202) of hot-melting glue or wax and the fine metal layer (201), said layer of varnish providing protection for the transferred reflecting pattern, in particular in relation to abrasion and solvents.

25. A carrier strip (F) according to claim 23 or claim 24 characterised in that a layer (205) of varnish is further provided between the fine metal layer (201) and the adhesion glue layer (203), said layer of varnish providing protection for the reflecting pattern to prevent penetration of the metal particles into the paper of the document upon transfer of the reflecting pattern.

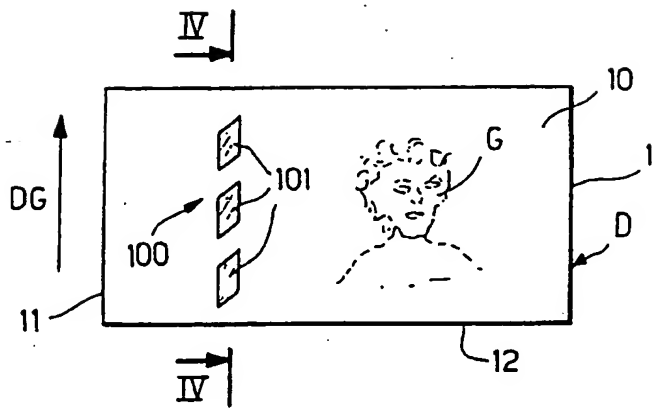


FIG.1

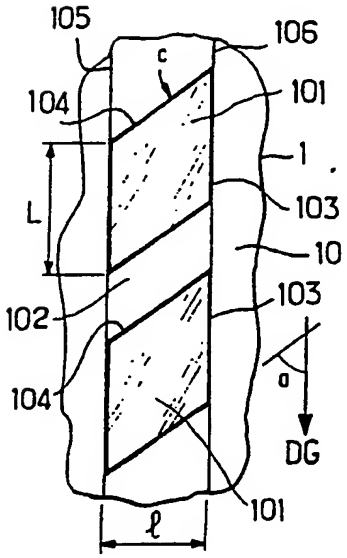


FIG.2

FIG.3

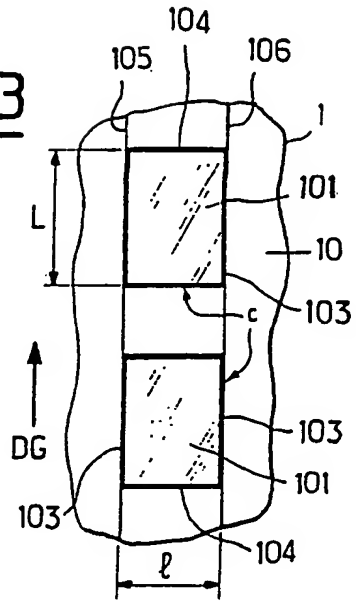


FIG.4a

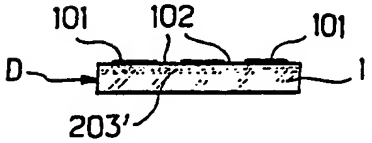


FIG.4b

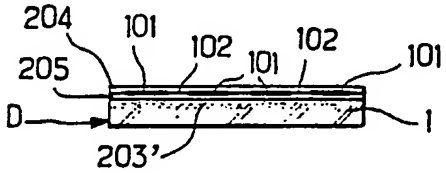


FIG.5a

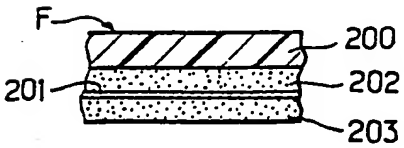
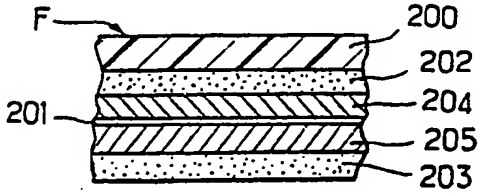


FIG.5b



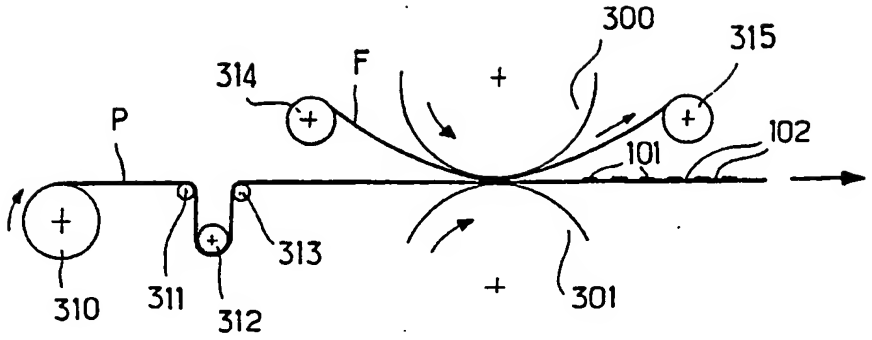


FIG.6

FIG.7

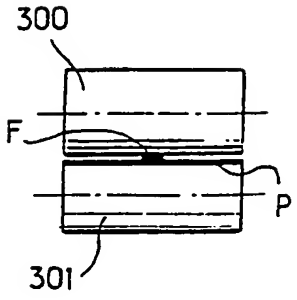


FIG.8

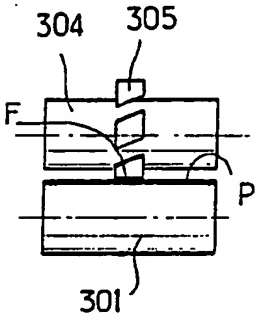


FIG.9

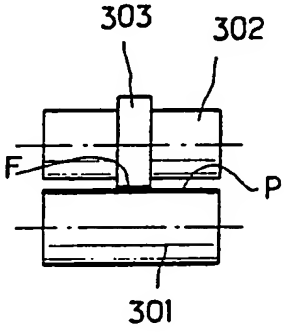
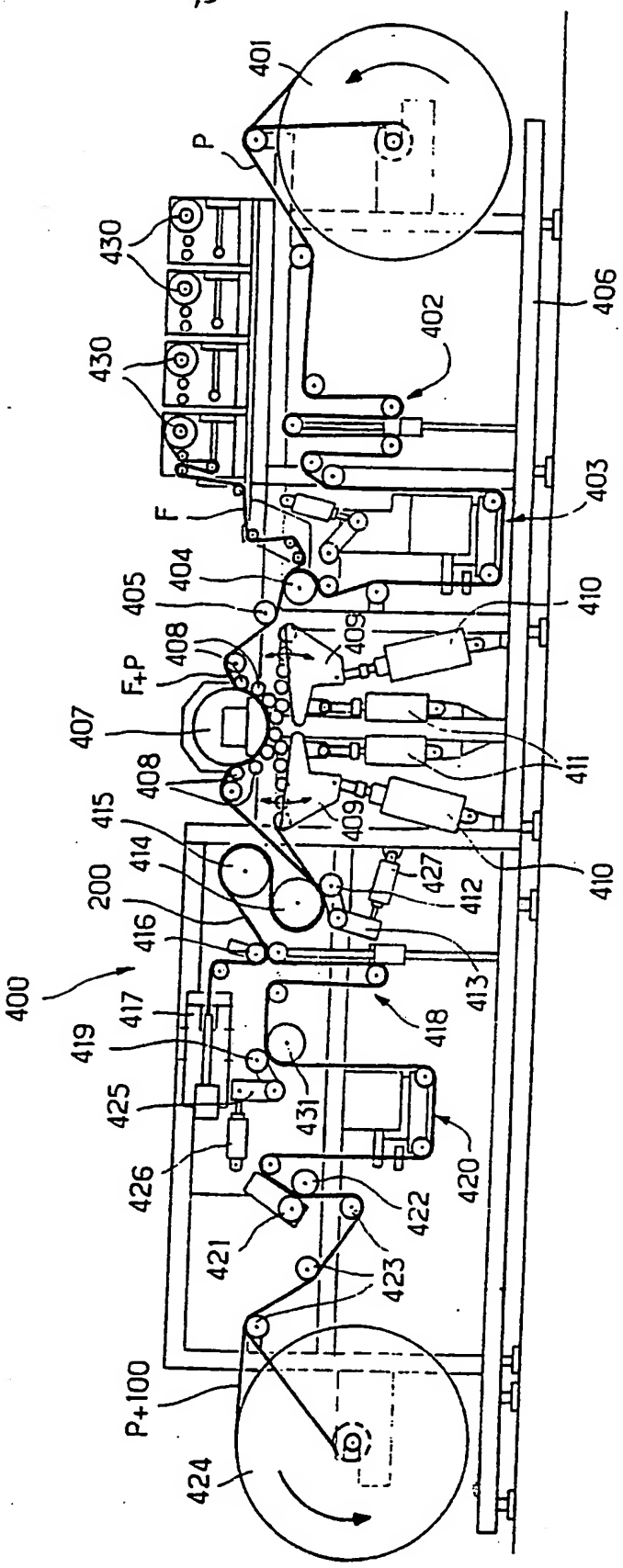


FIG. 10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INTERNATIONAL SEARCH REPORT

International Application N PCT/EP 92/01527

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B41M3/14; B42D15/00

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B41M ; B42D ; B44F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	EP,A,0 279 880 (CRANE & COMPANY) 31 August 1988 see column 3, line 37 - line 45; claim 1; figure 1 ---	1-25
A	GB,A,1 604 463 (THE GOVERNOR AND COMPANY OF THE BANK OF ENGLAND) 9 December 1981 see claim 1; figures 1,3,5 ---	1-25
A	FR,A,1 413 910 (PORTALS LIMITED) 6 September 1965 cited in the application see the whole document ---	1-25
A	FR,A,2 565 268 (GUERIMAND VOIRON) 6 December 1985 see the whole document ---	1-25

-/--

° Special categories of cited documents : [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
01 SEPTEMBER 1992	06. 10. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	BACON A.J. A.J. Bacon

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,1 574 614 (G.V.PLANER LIMITED) 10 September 1980 see the whole document ---	1-25

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. EP 9201527 SA 62219

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 01/09/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0279880	31-08-88	US-A- 4652015	24-03-87
GB-A-1604463	09-12-81	None	
FR-A-1413910		GB-A- 1095286	
FR-A-2565268	06-12-85	None	
GB-A-1574614	10-09-80	None	